DRAFT REPORT

OLYMPIA PLAZA II
TRAFFIC IMPACT STUDY

Prepared for

THE NEVADA COUNTY TRANSPORTATION COMMISSION

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Executive Summary

An extensive amount of analysis for several street network scenarios was prepared and is summarized in this report. The result of the various (seven) scenarios for different street networks is presented in Tables 3 and 4 of this report.

Project Impacts

The impact of the Olympia Plaza II project traffic to the surrounding street system is not significant enough to warrant any mitigations above and beyond that already needed and recommended in the Brunswick Corridor Study. There is some overlap between that corridor study and this traffic study, where improvements were previously identified for the Sutton Way / Brunswick Road intersection, as well as the need (or lack of need) for the Old Tunnel connector road between Brunswick Road and Sutton Way. It was determined in the recent corridor study that a new Old Tunnel Cutoff road was not needed to achieve satisfactory levels of service for Brunswick Road (in particular, to help reduce traffic volumes at the Sutton Way intersection), since the main intersection of Sutton Way and Brunswick could be satisfactorily mitigated with a minor change. It was recommended in that study that a lane change (add lane to southbound left turn movement) could be accomplished through a minor restriping and possible signal pole modification/extension. The viability of this mitigation assumes that Dorsey Drive is constructed in the future to reduce existing and future traffic impacts to the Brunswick corridor. The Dorsey Drive interchange is a long-standing planned and anticipated improvement, the cost of which is built into the mitigation fee program.

Mitigations

The Brunswick Road southbound approach mitigation (detailed above) was identified and recommended in the Brunswick Road Corridor study (which did not assume any traffic from the Olympia Plaza II project). Now that the project traffic was also added in for the various analyses in this traffic impact study, it was determined that the improvement provides sufficient capacity, once constructed, to satisfactorily handle anticipated traffic even from the Olympia Plaza II project. No further mitigations to the surrounding street system to handle project traffic are needed or recommended for the Olympia Plaza II project, beyond paying into the mitigation fee program.

Parking Space Design on Site Plan Needs Modification

The angled parking space design shown on the plan is inadequate to accommodate parking maneuvers. The proposed cross section width for Plaza Drive of 64 feet needs to be increased to 72 feet to meet code. The entire stretch of Plaza Drive is proposed to have on-street angled parking, however, with the angle of the parking spaces set at 60 degrees, an "aisle width" of 16 feet[1] is needed on both sides of the road. Without this width, traffic would be forced to cross over the centerline striping to adequately turn their vehicle to gain access to the parking space. There is only 24 feet of aisle width on Plaza Drive in addition to the parking spaces which occupy a 20 foot width on each side. This 24 foot aisle width needs to be increase to 32 feet so that 16 foot lanes are provided. This means that an additional 8 feet of cross-section width to Plaza Drive will be needed for the proposed angled parking. A total cross-section width of 64 feet is now shown on the plans. This needs to be increased to 72 feet to allow for the needed additional 8 feet (20+16+16+20=72 feet width).

[1] See Figure 27-2 Aisle and Stall Dimensions for Various Angles of Parking, *Fundamentals of Traffic Engineering, 13th edition*, ITE.

Introduction and Overview

The project study area was recently studied in light of the entire Brunswick Road corridor from SR 20 on the north end to SR 174 on the south end. In that study it was found that the intersection of Brunswick Road and Sutton Way could operate at LOS D or better conditions in the future with some mitigations. These mitigations also partially work for the Olympia Plaza II project, with some modifications. A partial discussion of these improvements from the Brunswick Corridor study have been included in this section for convenience.

Sutton Way Intersection at Brunswick Road

This intersection currently operates at LOS D/E conditions. One of the existing capacity problems at the intersection is with the left turn pocket on Brunswick Road southbound for traffic entering Sutton Way to the east (see Figure BC1 below). This turn pocket is only 250 feet in length, but the pm peak hour traffic volume is 366 vph for existing conditions, and is projected to go to 469 vph in the Year 2020.

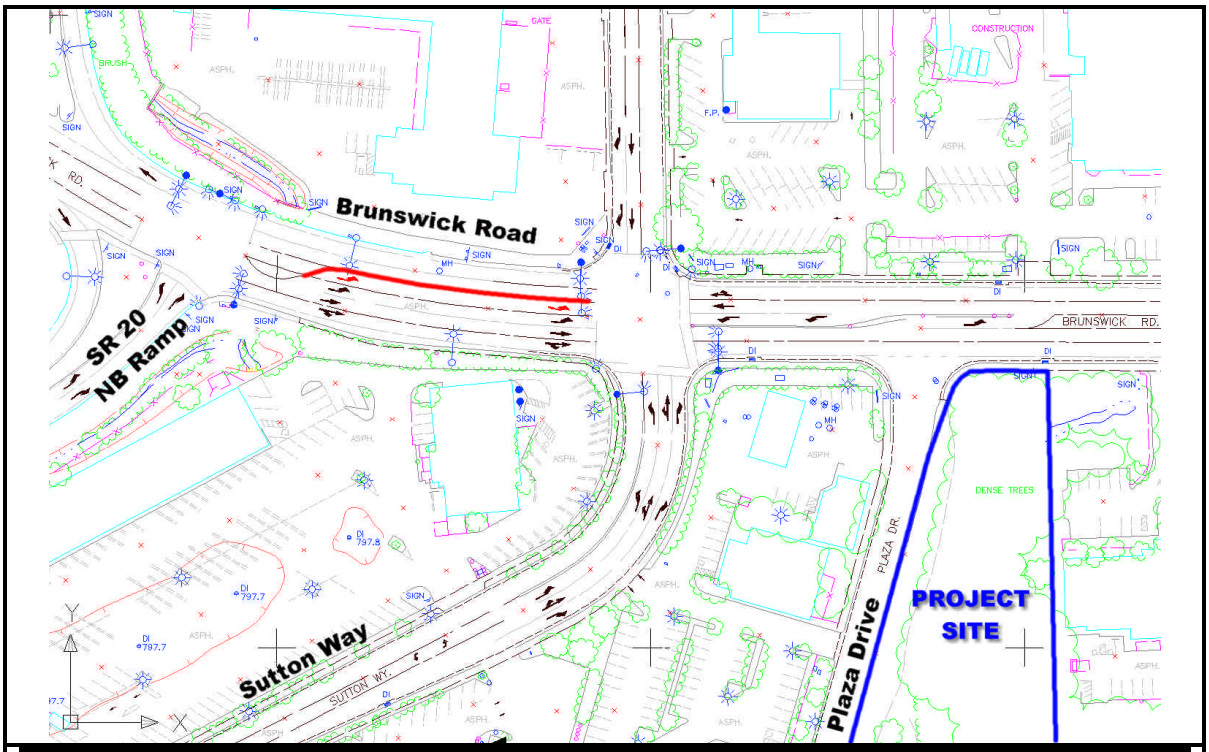


Figure BC1 Sutton Way at Brunswick Road

Figure BC1 shows the existing configuration at this location, along with a proposed mitigation. It is possible to mitigate this intersection to operate at LOS D or better conditions in the future if a dual left turn pocket is installed at the location shown in Figure BC1, and as detailed in the *CORRIDOR STUDY FOR BRUNSWICK ROAD FROM SR 20 TO SR 174* (dated October 24, 2001), and prepared for the Nevada County Transportation Commission (NCTC).

Project Description

The proposed project includes the development of the following:
A mixed use development of commercial retail, offices, and residential apartments / multi-family dwelling unit buildings. There would be three phases of development in this project, with totals of approximately 53,000 square feet of retail and office space, combined with 40 multiple family dwelling units on 13.68 acres. The project has been divided into three phases of development, with Phase 1 taking place beginning in the spring of 2002. The phasing plan is as follows:

Phase	Retail / Office	Multiple Family	Parking
1	35,880 SF	10 units	209 spaces
2	16,820 SF	18 units	81 spaces
3	None	12 units	24 spaces
Totals >>	52,700 SF	40 units	314 spaces

The project area is in the unincorporated territory of Nevada County. Annexation to the City of Grass Valley is pending and expected to be complete at the end of Year 2001.

Study Area Roadways

Brunswick Road: A four lane arterial facility in the vicinity of the project with some widening at intersection approaches to accommodate turn lanes, etc. This is a major arterial roadway, currently carrying over 1,600 vehicles per hour in the pm peak hour (approximately 16,000 vehicles per day). Bridge volumes over the SR 20/49 freeway are even higher at 2,640 vehicles per hour during the pm peak hour. Terrain is flat to rolling hills, with some mountainous (steeper than 6%) outside of the study area.

Sutton Way: A two lane collector facility that runs from Idaho Maryland on the south to Brunswick Road and just beyond on the north. This road has a two way left turn lane median in the vicinity south of Brunswick Road to service commercial development adjacent to both sides of the road. Sutton Way south also widens out at its intersection with Brunswick Road to a four lane cross-section to accommodate one lane in from Brunswick and three lanes out to Brunswick. Terrain is flat to rolling hills.

Plaza Drive: A short two lane 24 foot wide minor roadway connecting Sutton Way on the south and Brunswick Road on the north. Access to Brunswick Road is limited to right turns in and right turns out. This road primarily services adjacent commercial development. Terrain on this road is flat to rolling hills.

Old Tunnel: A two lane collector roadway that connects Brunswick Road on the south to Banner Lava Cap on the north. Traffic demand using this road is primarily from Brunswick Road to the north (2/3), and the remaining third travels to and from the south on Brunswick Road. The grades on this road are mountainous (steeper than 6%).

Study Area

The study area for this report consists primarily of the Brunswick and Sutton Way street systems in the vicinity of the project site. Included are specific intersections along Brunswick Road and Sutton Way. The intersections studied in this report include the following:

Intersection	Status
Brunswick at Nevada City Hwy	Existing Intersection
Brunswick at SR 20 NB Ramps	Existing Intersection
Brunswick at Sutton Way	Existing Intersection
Brunswick at Plaza Way	Existing Intersection
Brunswick at Old Tunnel	Existing Intersection
Olympia and Old Tunnel Cutoff	Possible Future Intersection
Sutton and Old Tunnel Cutoff	Possible Future Intersection

Figure 1 is a vicinity map showing the location of these intersections in the study area, as well as the project site location. Figure 2 shows the existing intersection lane details for Brunswick Road.

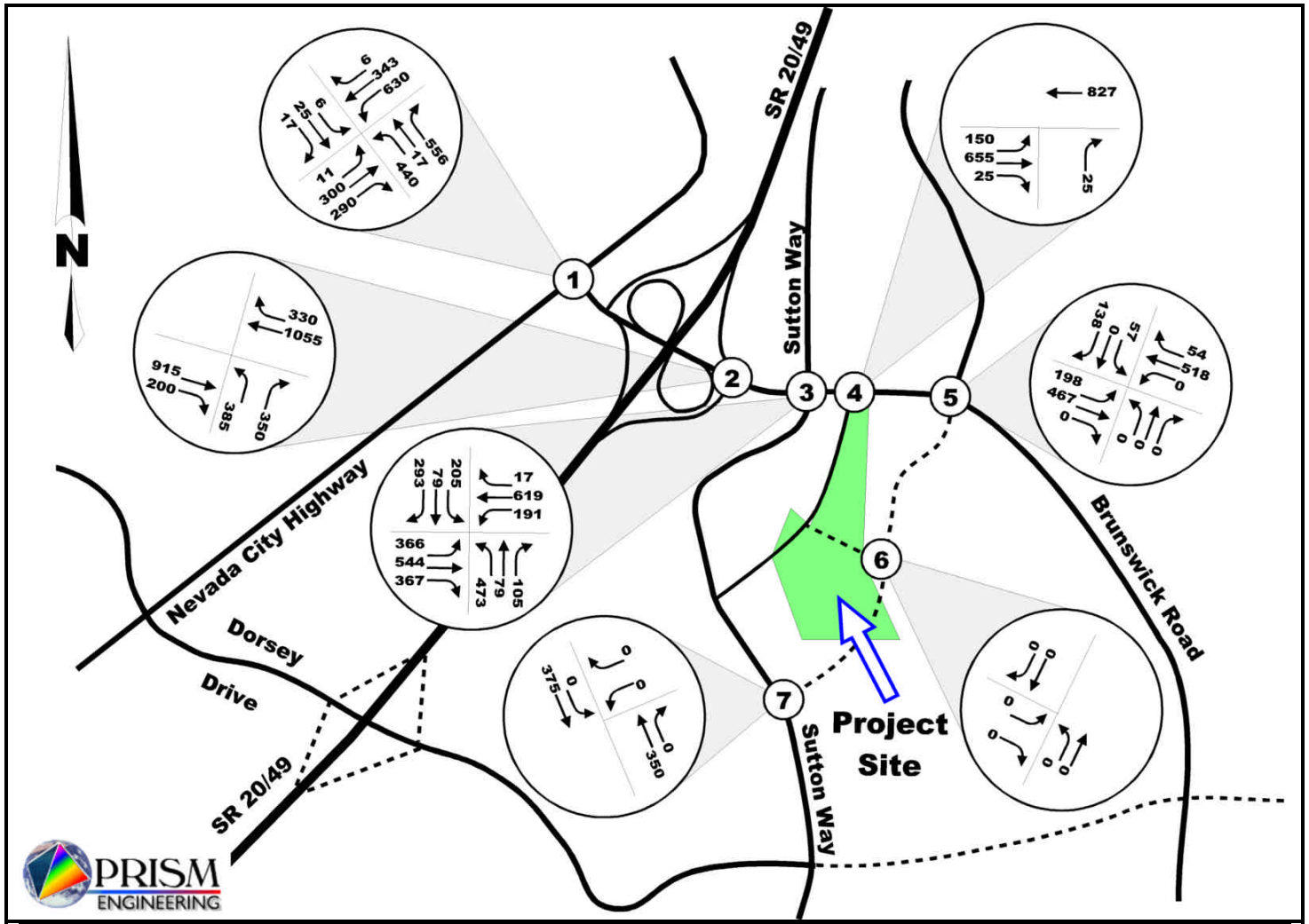


Figure 1 Study Area Intersections and Existing PM Peak Turning Movements

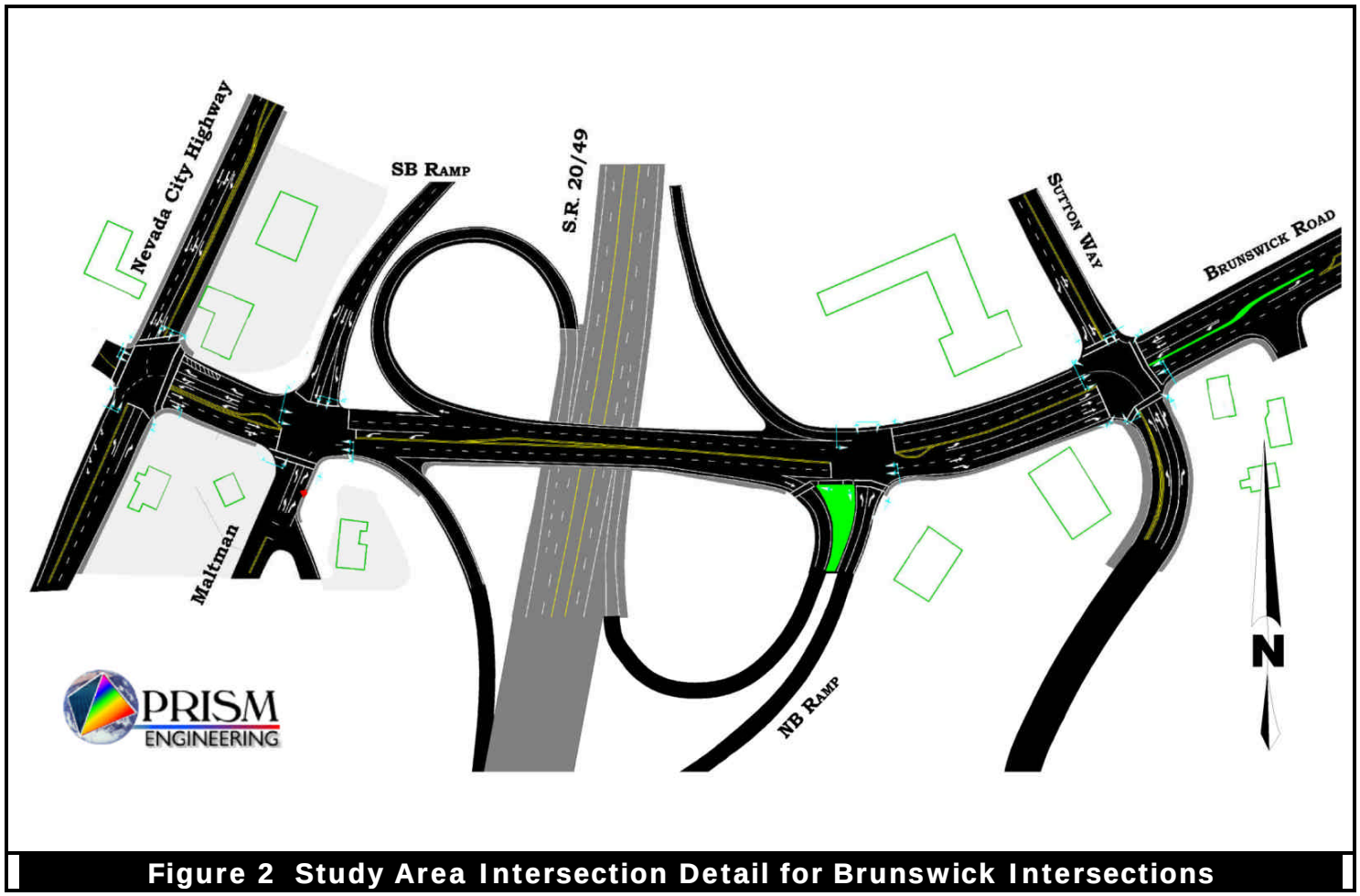


Figure 2 Study Area Intersection Detail for Brunswick Intersections

Project Trip Generation and Distribution

The project consists of a mixed use development with approximately 53,000 square feet of retail and office space, combined with 40 multiple family dwelling units on 13.68 acres. The project has been divided into three phases of development, with Phase 1 taking place beginning in the spring of 2002. Table 1A reports the projected trip generation for the project site in the first phase of development, or coinciding with the existing plus project scenario. The table reports that 234 pm peak hour trips are anticipated for the project site, and which would access the local street system.

Table 1A
Trip Generation for Year 2002, Phase 1

ITE Code	Land Use	Quantity	Peak Hour Trip Rate	Peak Hour Trips
850	Grocery Store / Supermarket (Briar Patch)	10.0 KSF	11.51	115
814	Specialty Retail / Office	25.9 KSF	4.34	112
220	Apartments	10 DU	0.62	6
	PM Peak Hour Total >>>			**234**
ITE Trip Generation Manual, 6th Edition				
PRISM Engineering				

Table 1B reports the total trip generation of the project, or that which is anticipated to occur by the Year 2020 (Year 2020 plus project). With the addition of Phase 2 and 3 traffic, the total pm peak hour volume anticipated for the project site is 325 trips. This represents an additional 91 trips above the Phase 1 totals.

Table 1B
Trip Generation for Year 2020, Phases 1-3

W

ITE Code	Land Use	Quantity	Peak Hour Trip Rate	Peak Hour Trips
850	Grocery Store / Supermarket (Briar Patch)	10.0 KSF	11.51	115
814	Specialty Retail / Office	42.7 KSF	4.34	185
220	Apartments	40 DU	0.62	25
	PM Peak Hour Total >>>			**325**
ITE Trip Generation Manual, 6th Edition				
PRISM Engineering				

The Olympia Plaza project's trip generation is expected to have the greatest impact during the pm peak hour time period, or when the highest volumes are expected on adjacent streets (midweek peak hour between 4:00-6:00 pm). The project trip generation during the pm peak Hour of an average midweek day is the focus of the scenarios in this traffic study.

The trip distribution of the project traffic was done with the aid of the NCTC traffic model used in the Brunswick Basin Corridor Study as well as the recently developed NCTC TP+ model. With these tools it was possible to get a good idea of where the project traffic would travel in the future as additional developments come on line in the County, as well as future transportation improvements take place.

Two figures have been developed to define how the project traffic was distributed for the existing plus project conditions, as well as the future plus project conditions. Figure 3

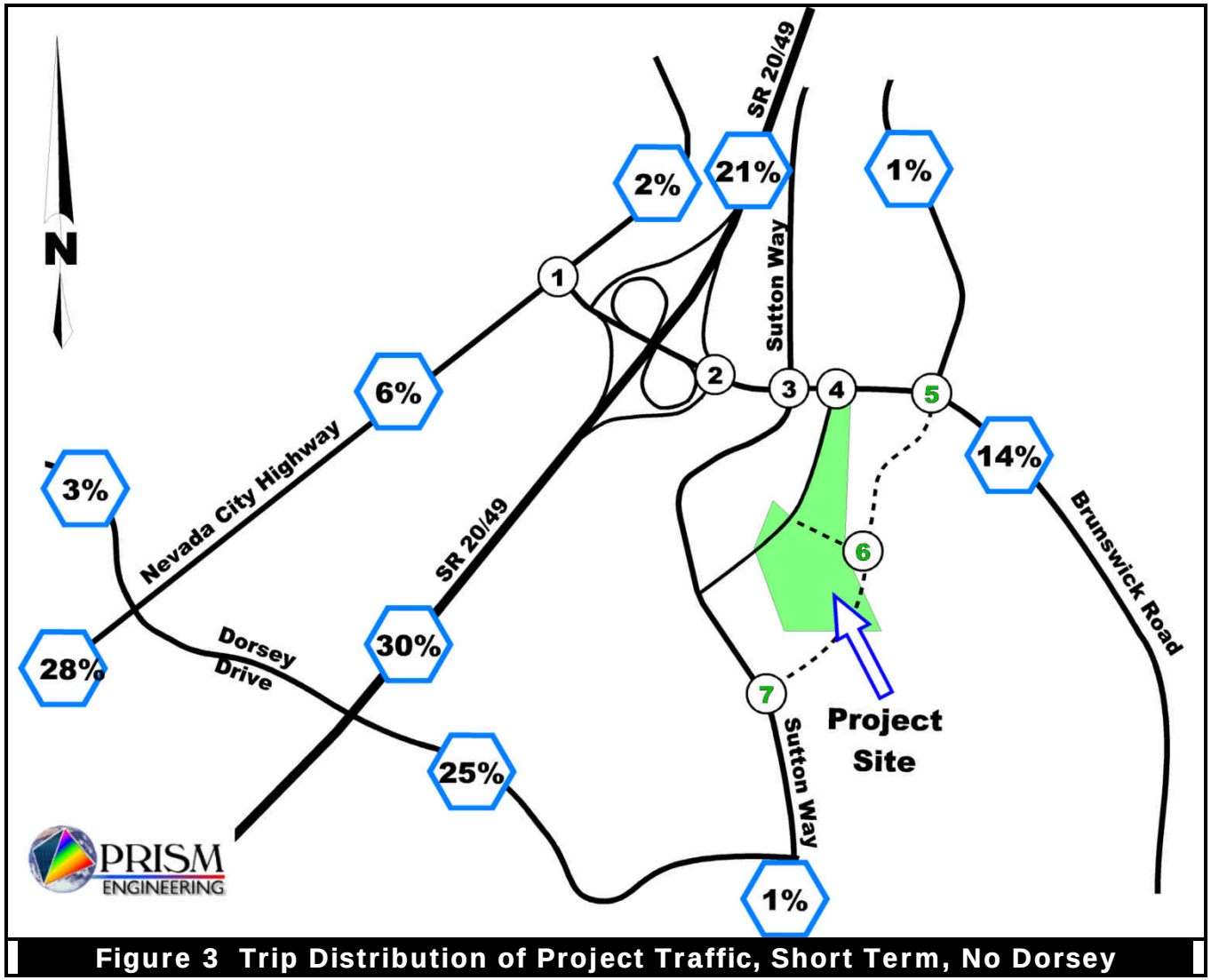


Figure 3 Trip Distribution of Project Traffic, Short Term, No Dorsey

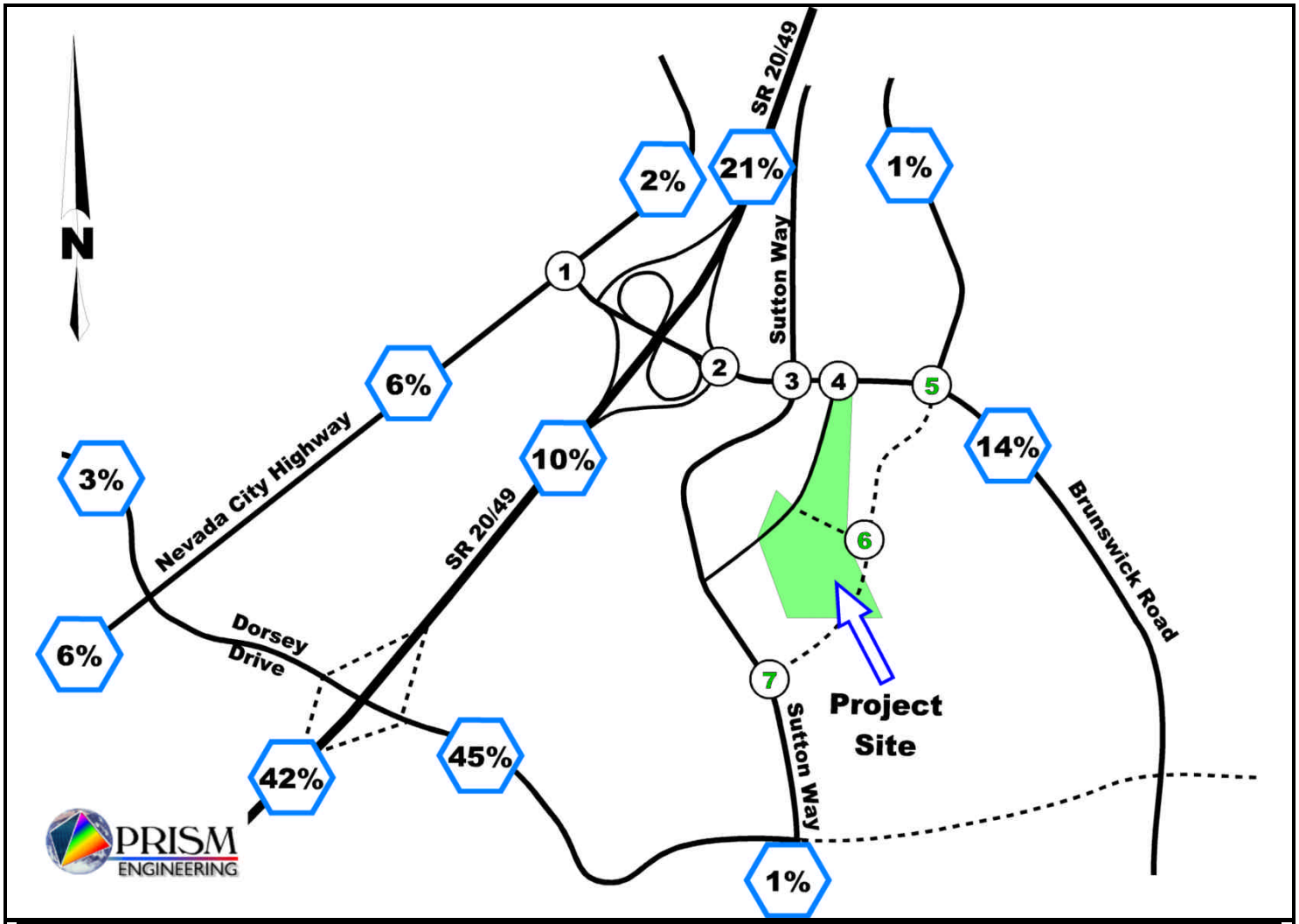


Figure 4 Trip Distribution of Project Traffic, Year 2020, With Dorsey

Traffic Analysis

The traffic analysis examines the Year 2002 plus project as well as the Year 2020 plus project scenarios. Seven specific street network access scenarios for the project we also studied as a part of this effort. The scenarios examined for project access included:

Number	Scenario Description
1	Access to Sutton only. This scenario assumes that all traffic goes to Sutton Way.
2	Access to Sutton and Brunswick (right in / right out on Brunswick), the existing condition for Plaza Drive.
3	Access to Sutton and Brunswick (full access with left turn pocket), a modification to the Brunswick median to accommodate this outbound left turn movement.
4	Access to Sutton, Brunswick, and Old Tunnel from south side of project (assumes a new roadway connecting project across non-project lands to Old Tunnel).
5	Access to Sutton, Brunswick, and Old Tunnel from top/north side of project (assumes a more direct and shorter alignment from project to Old Tunnel).
6	Main Access to Old Tunnel connection (assumes that all project traffic will be directed to the new Old Tunnel Road connector, to access Brunswick at that location).
7	Access to New Connection between Sutton and Old Tunnel (assumes a new connector at a point between Old Tunnel and Sutton Way).

The study intersections in the vicinity of the project site include:

Intersection	Status
Brunswick at Nevada City Hwy	Existing Intersection
Brunswick at SR 20 NB Ramps	Existing Intersection
Brunswick at Sutton Way	Existing Intersection
Brunswick at Plaza Way	Existing Intersection
Brunswick at Old Tunnel	Existing Intersection
Olympia and Old Tunnel Cutoff	Possible Future Intersection
Sutton and Old Tunnel Cutoff	Possible Future Intersection

These existing and future intersections and their locations, as well as existing turning movements (where applicable) are identified on Figure 1.

Parking Access and Adequacy

The detailed site plan for the proposed Olympia Plaza II project was examined to determine how well the parking spaces interface with the proposed Plaza Drive modifications. The parking spaces are designed on the plan with a width of 9 feet, which is adequate for public parking spaces. The entire stretch of Plaza Drive is proposed to have on-street angled parking, with the same 9 foot width for each space. The angle of the parking spaces with the curb is set at 60 degrees, which is also a typical standard for on-street parking. When parking spaces are set at 60 degrees, the aisle or lane space needs to be at least 16 feet[2]. There is 24 feet of aisle width on Plaza Drive proposed to exist between the parking spaces on each side of the road. If the road is striped with centerline striping, the only way that vehicles can get into and out of the parking spaces is to cross the centerline striping, since lane widths would be 12 feet, and the standard needed aisle width is 16 feet. There would be a shortfall of 4 feet on each side. In order to avoid the blocking of vehicular traffic flow on the two way street during parking maneuvers, it will be necessary to increase the width of the traveled aisle way to 32 feet (16 feet on both sides of the center-line striping). Since the parking spaces will require a 20 foot distance from curb to the traveled aisle way, and an additional 16 feet of aisle space for each side, the total cross-section distance, curb to curb, will be 20+16+16+20=72 feet. There is only 64 feet shown. An additional 8 feet of width to Plaza Drive will be needed to provide the angled parking needed.

Methodology

Traffic volumes were developed using the NCTC's MINUTP and TP+ traffic models, with some adjustments to land uses along the Brunswick corridor as developed by Nevada County DOT. This study is intended to build upon the Brunswick Corridor Study due to the potential that the project has to alter the outcome of the results of that study. The Existing plus project, as well as the future (Year 2020) plus project traffic scenarios during the pm peak hour were selected as the analysis time periods for the purposes of this study.

[2] See Figure 27-2 Aisle and Stall Dimensions for Various Angles of Parking, *Fundamentals of Traffic Engineering, 13th edition*, ITE.

Synchro 5.0 was utilized to calculate level of service for each of the study intersections. The Synchro software is now capable of analyzing the intersection turning movements using a variety of different "views" of the traffic impacts, so that a better picture of what is taking place can be seen. In the tables that follow, the "delay" and Intersection Capacity Utilization (ICU) levels of service are reported.

Reference is made to Table 2A for a summary of the "delay" level of service criteria used in the analyses, and Table 2B for a summary of ICU level of service criteria.

Levels of service were calculated using a delay criteria scale as follows:

Table 2A
Delay Level of Service Criteria

LOS	Unsignalized	Signalized
A	1-10 seconds	1-10 seconds
B	11-15 seconds	11-20 seconds
C	16-25 seconds	21-35 seconds
D	26-35 seconds	36-55 seconds
E	36-50 seconds	56-80 seconds
F	51+ seconds	81+ seconds

Source: PRISM Engineering, Synchro Pro, and HCM

Levels of service were also calculated using an ICU criteria scale as follows:

Table 2B
ICU Level of Service Criteria

LOS and ICU Range	A brief description of the conditions expected for each level of service follows:
LOS A **ICU <= 0.60**	*The intersection has no congestion. A cycle length of 80 seconds or less will move traffic efficiently. All traffic should be served on the first cycle. Traffic fluctuations, accidents, and lane closures can be handled with minimal congestion. This intersection can accommodate up to 40% more traffic on all movements.*
LOS B **0.60 < ICU** **ICU <= 0.70**	*The intersection has very little congestion. Almost all traffic will be served on the first cycle. A cycle length of 90 seconds or less will move traffic efficiently. Traffic fluctuations, accidents, and lane closures can be handled with minimal congestion. This intersection can accommodate up to 30% more traffic on all movements*
LOS C **0.70 < ICU** **ICU <= 0.80**	*The intersection has no major congestion. Most traffic should be served on the first cycle. A cycle length of 100 seconds or less will move traffic efficiently. Traffic fluctuations, accidents, and lane closures may cause some congestion. This intersection can accommodate up to 20% more traffic on all movements.*
LOS D **0.80 < ICU** **ICU <= 0.90**	*The intersection normally has no congestion. The majority of traffic should be served on the first cycle. A cycle length of 110 seconds or less will move traffic efficiently. Traffic fluctuations, accidents, and lane closures can cause significant congestion. Sub optimal signal timings cause congestion. This intersection can accommodate up to 10% more traffic on all movements.*
LOS E **0.90 < ICU** **ICU <= 1.00**	*The intersection is right on the verge of congested conditions. Many vehicles are not served on the first cycle. A cycle length of 120 seconds is required to move all traffic. Minor traffic fluctuations, accidents, and lane closures can cause significant congestion. Sub optimal signal timings can cause significant congestion. This intersection has less than 10% reserve capacity available.*
LOS F **1.00 < ICU** **ICU <= 1.10**	*The intersection is over capacity and likely experiences congestion periods of 15 to 60 minutes per day. Residual queues at the end of green are common. A cycle length over 120 seconds is required to move all traffic. Minor traffic fluctuations, accidents, and lane closures can cause increased congestion. Sub optimal signal timings can cause increased congestion.*

Source: PRISM Engineering, Synchro Pro, and HCM

Interpreting the "ICU" Level of Service

The ICU Level of Service (LOS) gives insight into how an intersection is functioning and how much extra capacity is available to handle traffic fluctuations and incidents. ICU is not a value that can be measured with a

stopwatch, but it does give a good reading on the conditions that can be expected at the intersection. This method of LOS rank is best suited for planning analyses, such as are used in traffic impact studies, and more especially for unsignalized intersections. It shows a more conservative LOS based on conditions that are more closely related to available capacity and its utilization, and not delay.

Interpreting the "Delay" Level of Service

The Intersection Delay field shows the average control delay for a signalized intersection and it is calculated by taking a volume weighted average of all the delays. The average intersection delay for unsignalized intersections based on an average of each movement's delays. This method of LOS rank is based on how well an intersection may operate given LOS enhancing mitigations through signal timing. For this reason, a "delay" LOS may be better than an "ICU" LOS due to signal timing benefits.

Table 3 follows, and reports the levels of service (ICU and Delay) for the two analysis years, with and without the project at the 7 study intersections (Year 2002 and Year 2020).

Table 3

PM Peak Hour Analysis Summary, Unmitigated

Scenario 1

	Study Intersection		2002		2002		2002 + Project		2002 + Project		2020		2020		2020 + Project		2020 + Project	
			delay secs	delay LOS	ICU ratio	ICU LOS	delay secs	delay LOS	ICU ratio	ICU LOS	delay secs	delay LOS	ICU ratio	ICU LOS	delay secs	delay LOS	ICU ratio	ICU LOS
1	Signal	Brunswick at Nevada City Hwy	28	**C**	0.69	**B**	30	**C**	0.69	**B**	30	**C**	0.73	**C**	30	**C**	0.73	**C**
2	Signal	Brunswick at SR 20 NB Ramps	17	**B**	0.66	**B**	18	**B**	0.70	**B/C**	18	**B**	0.74	**C**	19	**B**	0.76	**C**
3	Signal	Brunswick at Sutton Way	35	**D**	0.76	**C**	39	**D**	0.78	**C**	42	**D**	0.88	**D**	42	**D**	0.88	**D**
4	1Way	Brunswick at Plaza Way	*N/A*	*N/A*	0.52	**A**	*N/A*	*N/A*	0.53	**A**	*N/A*	*N/A*	0.76	**C**	*N/A*	*N/A*	0.79	**C**
5	1Way	Brunswick at Old Tunnel	*N/A*	*N/A*	0.66	**B**	*N/A*	*N/A*	0.67	**B**	*N/A*	*N/A*	0.78	**C**	*N/A*	*N/A*	0.79	**C**
6	1Way	Olympia and Old Tunnel Cutoff	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
7	1Way	Sutton and Old Tunnel Cutoff	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

Source: PRISM Engineering

Table 4

PM Peak Hour Analysis Summary, Unmitigated

Scenario 2

	Study Intersection	2002		2002		2002 + Project		2002 + Project		2020		2020		2020 + Project		2020 + Project	
		delay secs	delay LOS	ICU ratio	ICU LOS	delay secs	delay LOS	ICU ratio	ICU LOS	delay secs	delay LOS	ICU ratio	ICU LOS	delay secs	delay LOS	ICU ratio	ICU LOS
1	Signal Brunswick at Nevada City Hwy	28	**C**	0.69	**B**	29	**C**	0.66	**B**	30	**C**	0.73	**C**	30	**C**	0.73	**C**
2	Signal Brunswick at SR 20 NB Ramps	17	**B**	0.66	**B**	18	**B**	0.68	**B**	18	**B**	0.74	**C**	19	**B**	0.76	**C**
3	Signal Brunswick at Sutton Way	35	**D**	0.76	**C**	39	**D**	0.78	**C**	42	**D**	0.88	**D**	42	**D**	0.88	**D**
4	1Way Brunswick at Plaza Way	*N/A*	*N/A*	0.52	**A**	*N/A*	*N/A*	0.53	**A**	*N/A*	*N/A*	0.76	**C**	*N/A*	*N/A*	0.79	**C**
5	1Way Brunswick at Old Tunnel	*N/A*	*N/A*	0.66	**B**	*N/A*	*N/A*	0.67	**B**	*N/A*	*N/A*	0.78	**C**	*N/A*	*N/A*	0.79	**C**
6	1Way Olympia and Old Tunnel Cutoff	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
7	1Way Sutton and Old Tunnel Cutoff	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

Source: PRISM Engineering

Tables 3 and 4 report the level of service results for the first two scenarios. The remaining 5 scenarios were examined for the purpose of taking traffic away from the Sutton Way / Brunswick intersection which is slightly congested during peak hour time periods (LOS D).

Scenario 1

The first scenario assumes that all of the project traffic will gain access to the surrounding street system via Sutton Way only, and that the main majority of traffic impact will be felt along the Sutton Way corridor. This scenario creates the maximum impact to the most critical intersection of Sutton Way at Brunswick Road. It is the scenario in which the highest (or most negative) impacts occurred, where all of the project traffic was assigned to Sutton Way, and in the short term, towards the Brunswick corridor (as depicted in Figure 3), and to a lesser extent in the Year 2020 (when the Dorsey Drive / SR 20/49 freeway interchange is assumed to be online) when more of the project traffic is assigned south on Sutton Way towards the Dorsey Drive interchange (see Figure 4).

Since the existing LOS for the intersection is at LOS D, and with the addition of project traffic the intersection can remain at LOS D conditions with the worst case scenario (all traffic assigned to Sutton Way), it is concluded that additional mitigations are not necessary. All other scenarios, while able to enhance circulation and provide some relief to the Sutton Way / Brunswick intersection, can not at this time be justified from a level of service standpoint. No additional roadways to service the project will be necessary in order to maintain satisfactory levels of service. However, if the Dorsey Drive interchange is not constructed in the future, it would be necessary to build additional roadways (such as the Old Tunnel connector road, etc.).

It was recommended in the Brunswick Corridor Study that an additional left turn lane be installed for the southbound approach of the Sutton Way / Brunswick Road intersection (as shown in Figure BC1 of this report). This improvement will reduce the ICU ratio nearly 15% and will improve levels of service to the LOS C/D range in the future. No further mitigations beyond this planned mitigation will be necessary to handle Olympia Plaza II project traffic.

Scenario 2

This is the scenario that is most likely to take place. In this scenario, the project traffic was assigned to Sutton Way again, but also some of the traffic (towards the south on Brunswick, and some of the inbound traffic from north on Brunswick) was assigned to the Plaza Drive intersection with Brunswick Road. This is a right in and right out connection with Brunswick Road, and there is a median on Brunswick Road which prevents any traffic from turning left onto Brunswick Road. Even so, this scenario assumed slightly less project traffic utilizing the Sutton Way / Brunswick Road intersection, but the benefit is insignificant, and does not show up in the calculations because the change in impact is so small.

Once the recommended improvement identified in the Brunswick Corridor Study is implemented (install / stripe an additional left turn lane for the southbound approach of Brunswick Road at Sutton), there will be a capacity related improvement to LOS at the intersection that will allow passage of anticipated Olympia Plaza II traffic without negatively impacting the intersection LOS. No further mitigations beyond the planned mitigation (see Figure BC1) will be necessary to handle Olympia Plaza II project traffic. The project should not be constructed until this improvement is in place.

Remaining Scenarios

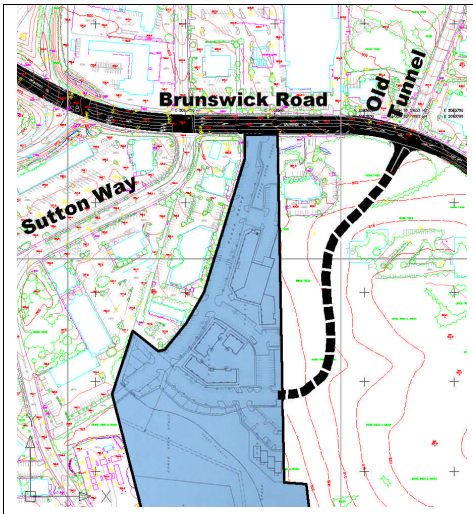
Five other scenarios were developed in this study, for which traffic volumes and turning movements at all of the study intersections were prepared and analyzed. It was determined that none of these various scenarios added any significant benefit to the Brunswick Basin land Brunswick Road corridor level of service, or for the Sutton Way level of service. The added expense and impact of these scenarios (new signals installed, new roadways built, negative impacts to traffic operations on the Brunswick Road corridor, etc.) was deemed sufficient reason to rule out the need (for now) to install the Old Tunnel Cutoff Road or any of its derivatives. A summary of the remaining scenarios follows.

Scenario 3

In this scenario access to Sutton was assumed, but with a reconstruction of the Plaza Drive / Brunswick intersection to provide full access with left turn pockets on all approaches. The only way for this scenario to work would be to install an additional signal on Brunswick at Plaza in the close proximity of Sutton Way (which would significantly impact Sutton Way / Brunswick traffic operations and pocket lengths, etc). It would also be necessary to open up

the median, install left turn pockets, etc., and redesign access for adjacent development, etc. The benefit of implementing this scenario was found to be insignificant from an LOS standpoint, (since the existing conditions in the area can handle traffic impacts from the project), and as a result was ruled out as ineffective and unnecessary.

Scenario 4



This scenario assumed that the project would still have access to Sutton Way, Brunswick Road via Plaza Drive, and a new connection via a new road to Old Tunnel (from south side of project). Since the Sutton Way intersection with Brunswick can be improved sufficient to handle projected volumes from the project and cumulative development (assuming the Dorsey Drive interchange gets built in the future), it is not necessary to provide additional capacity to handle project traffic. The improvements identified in this scenario (new road connecting to Old Tunnel) are not necessary.

Scenario 5

Assumes access to Sutton, Brunswick, and Old Tunnel from top/north side of project along a more direct and shorter alignment from the project site to the existing Old Tunnel intersection with Brunswick. A derivative of Scenario 4, this idea was found to have insignificant benefit to the street system from an LOS standpoint.

Scenario 6

Assumes that the majority of the project traffic would be directed to and from the Brunswick Road / Old Tunnel intersection via a new road connection. Level of service analyses found this scenario to be unnecessary to achieve satisfactory LOS.

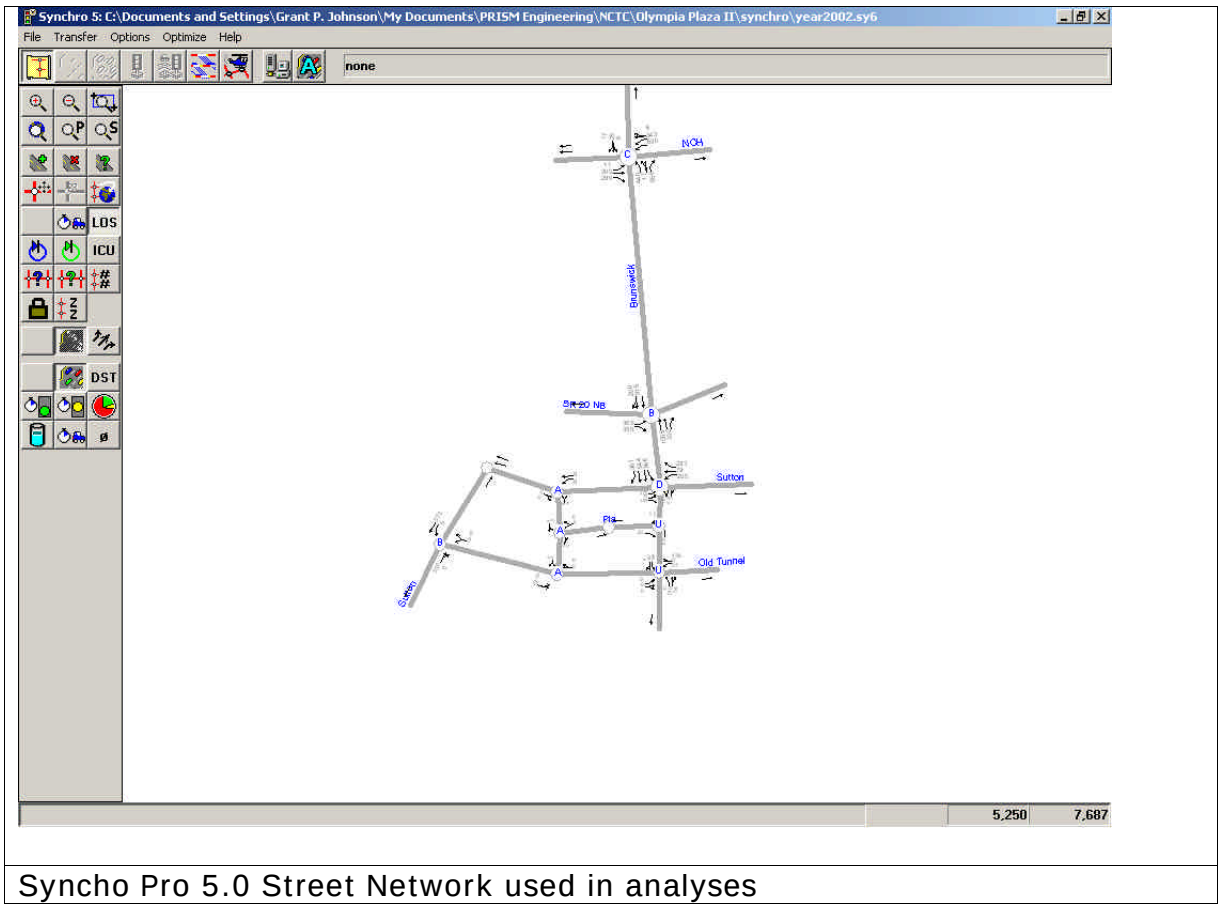
Scenario 7

A derivative of Scenario 6, this scenario further assumes a continuous connection of a new road from Brunswick Road to Sutton Way, with project access via a "T" intersection with this new road. Insignificant benefit to LOS in the study area, although traffic was found to utilize the "through"

connection. Can not be justified from an LOS standpoint, and is not recommended at this time.

APPENDIX

The following illustration is a sample of the Synchro Pro 5.0 street network that was developed for each of the 7 scenarios.



Syncho Pro 5.0 Street Network used in analyses

In the pages that follow, the traffic volumes developed for each scenario are reported for the Years 2002 and Years 2020 time periods. The volumes represent the pm peak hour.

Existing Traffic Volumes:

Intersection	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Brunswick at Nevada City Hwy	440	17	556	6	25	17	11	300	290	630	343	6
Brunswick at SR 20 NB Ramps	0	1055	330	0	915	200	385	0	350	0	0	0
Brunswick at Sutton Way	191	619	17	366	544	367	473	79	105	205	79	293
Brunswick at Plaza Way	0	827	0	150	655	25	0	0	25	0	0	0
Brunswick at Old Tunnel	0	518	54	198	467	0	0	0	0	57	0	138
Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
Sutton and Old Tunnel Cutoff	0	350	0	0	375	0	0	0	0	0	0	0

2020 Traffic Volumes (With Dorsey Interchange)

Cross Street	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Brunswick at Nevada City Hwy	466	18	589	6	27	18	12	318	307	668	364	6
Brunswick at SR 20 NB Ramps	0	1130	350	0	970	212	408	0	430	0	0	0
Brunswick at Sutton Way	96	600	27	469	717	217	452	51	45	368	58	430
Brunswick at Plaza Way	0	723	0	0	1105	25	0	0	25	0	0	0
Brunswick at Old Tunnel	0	518	65	294	460	0	0	0	0	126	0	218
Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
Sutton and Old Tunnel Cutoff	0	389	0	0	416	0	0	0	0	0	0	0

2002 Project Only Turn Percentages

Cross Street	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Brunswick at Nevada City Hwy	0.03	0	0.01	0	0	0	0	0	0.03	0.01	0	0
Brunswick at SR 20 NB Ramps	0	0.19	0.1	0	0.15	0	0	0	0.15	0	0	0
Brunswick at Sutton Way	0.08	0	0	0	0.21	0.09	0.29	0	0	0	0	0
Brunswick at Plaza Way	0	0	0	0	0	0.21	0	0	0.07	0	0	0
Brunswick at Old Tunnel	0	0.07	0	0	0.07	0	0	0	0	0	0	0
Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
Sutton and Old Tunnel Cutoff	0	0.13	0	0	0.13	0	0	0	0	0	0	0

2002 Project Only Turn Moves

Cross Street	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Brunswick at Nevada City Hwy	7		2						7	2		
Brunswick at SR 20 NB Ramps		44	24		34				36			
Brunswick at Sutton Way	18				49	21	68					
Brunswick at Plaza Way						49			17			
Brunswick at Old Tunnel		17		1	16							1
Olympia and Old Tunnel Cutoff												
Sutton and Old Tunnel Cutoff		31			30							

2020 Project Only Turn Percentages

Cross Street	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Brunswick at Nevada City Hwy	0.03	0	0.01	0	0	0	0	0	0.03	0.01	0	0
Brunswick at SR 20 NB Ramps	0	0.09	0.1	0	0.15	0	0	0	0.05	0	0	0
Brunswick at Sutton Way	0.08	0	0	0	0.1	0.05	0.19	0	0	0	0	0
Brunswick at Plaza Way	0	0	0	0	0	0.1	0	0	0.07	0	0	0
Brunswick at Old Tunnel	0	0.07	0	0	0.07	0	0	0	0	0	0	0
Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
Sutton and Old Tunnel Cutoff	0	0.23	0	0	0.23	0	0	0	0	0	0	0

2020 Project Only Turn Moves

Cross Street	NB			SB			EB			WB		
	L	T	R	L	T	R	L	T	R	L	T	R
Brunswick at Nevada City Hwy	9		2						9	2		
Brunswick at SR 20 NB Ramps		27	33		45				15			
Brunswick at Sutton Way	25				45	15	61					
Brunswick at Plaza Way		25				45			24			
Brunswick at Old Tunnel		23		2	22							2
Olympia and Old Tunnel Cutoff												
Sutton and Old Tunnel Cutoff		75			73							

Scenario		NB			SB			EB			WB	
1 Year 2002 Plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
1 Brunswick at Nevada City Hwy	447	17	558	6	25	17	11	300	297	632	343	6
1 Brunswick at SR 20 NB Ramps	0	1099	354	0	949	200	385	0	386	0	0	0
1 Brunswick at Sutton Way	209	619	17	366	544	437	541	79	122	205	79	293
1 Brunswick at Plaza Way	0	827	0	150	672	25	0	0	25	0	0	0
1 Brunswick at Old Tunnel	0	535	54	199	483	0	0	0	0	57	0	139
1 Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
1 Sutton and Old Tunnel Cutoff	0	381	0	0	405	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
1 Year 2020 plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
1 Brunswick at Nevada City Hwy	475	18	591	6	27	18	12	318	316	670	364	6
1 Brunswick at SR 20 NB Ramps	0	1157	383	0	1015	212	408	0	445	0	0	0
1 Brunswick at Sutton Way	121	600	27	469	717	277	513	51	69	368	58	430
1 Brunswick at Plaza Way	0	748	0	0	1129	25	0	0	25	0	0	0
1 Brunswick at Old Tunnel	0	541	65	296	482	0	0	0	0	126	0	220
1 Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
1 Sutton and Old Tunnel Cutoff	0	464	0	0	489	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
2	Year 2002 Plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
2	Brunswick at Nevada City Hwy	447	17	558	6	25	17	11	300	297	632	343	6
2	Brunswick at SR 20 NB Ramps	0	1099	354	0	949	200	385	0	386	0	0	0
2	Brunswick at Sutton Way	209	619	17	366	593	388	541	79	105	205	79	293
2	Brunswick at Plaza Way	0	827	0	150	655	74	0	0	42	0	0	0
2	Brunswick at Old Tunnel	0	535	54	199	483	0	0	0	0	57	0	139
2	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
2	Sutton and Old Tunnel Cutoff	0	381	0	0	405	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
2	Year 2020 plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
2	Brunswick at Nevada City Hwy	475	18	591	6	27	18	12	318	316	670	364	6
2	Brunswick at SR 20 NB Ramps	0	1157	383	0	1015	212	408	0	445	0	0	0
2	Brunswick at Sutton Way	121	600	27	469	762	232	513	51	45	368	58	430
2	Brunswick at Plaza Way	0	748	0	0	1105	70	0	0	49	0	0	0
2	Brunswick at Old Tunnel	0	541	65	296	482	0	0	0	0	126	0	220
2	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
2	Sutton and Old Tunnel Cutoff	0	464	0	0	489	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
3	Year 2002 Plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
3	Brunswick at Nevada City Hwy	447	17	558	6	25	17	11	300	297	632	343	6
3	Brunswick at SR 20 NB Ramps	0	1099	354	0	949	200	385	0	386	0	0	0
3	Brunswick at Sutton Way	191	687	17	366	593	388	473	79	105	205	79	293
3	Brunswick at Plaza Way	18	809	0	150	655	74	68	0	42	0	0	0
3	Brunswick at Old Tunnel	0	535	54	199	483	0	0	0	0	57	0	139
3	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
3	Sutton and Old Tunnel Cutoff	0	381	0	0	405	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
3	Year 2020 plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
3	Brunswick at Nevada City Hwy	475	18	591	6	27	18	12	318	316	670	364	6
3	Brunswick at SR 20 NB Ramps	0	1157	383	0	1015	212	408	0	445	0	0	0
3	Brunswick at Sutton Way	96	661	27	469	762	232	452	51	45	368	58	430
3	Brunswick at Plaza Way	25	723	0	0	1105	70	61	0	49	0	0	0
3	Brunswick at Old Tunnel	0	541	65	296	482	0	0	0	0	126	0	220
3	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
3	Sutton and Old Tunnel Cutoff	0	464	0	0	489	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
4	Year 2002 Plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
4	Brunswick at Nevada City Hwy	447	17	558	6	25	17	11	300	297	632	343	6
4	Brunswick at SR 20 NB Ramps	0	1099	354	0	949	200	385	0	386	0	0	0
4	Brunswick at Sutton Way	191	619	17	366	593	388	531	79	105	205	79	293
4	Brunswick at Plaza Way	0	809	0	150	655	74	0	0	34	0	0	0
4	Brunswick at Old Tunnel	35	518	54	199	475	0	10	0	8	57	0	139
4	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
4	Sutton and Old Tunnel Cutoff	0	381	0	0	405	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
4	Year 2020 plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
4	Brunswick at Nevada City Hwy	475	18	591	6	27	18	12	318	316	670	364	6
4	Brunswick at SR 20 NB Ramps	0	1157	383	0	1015	212	408	0	445	0	0	0
4	Brunswick at Sutton Way	96	600	27	469	762	232	503	51	45	368	58	430
4	Brunswick at Plaza Way	0	748	0	0	1105	70	0	0	39	0	0	0
4	Brunswick at Old Tunnel	25	518	65	296	472	0	10	0	10	126	0	220
4	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
4	Sutton and Old Tunnel Cutoff	0	464	0	0	489	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
5	Year 2002 Plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
5	Brunswick at Nevada City Hwy	447	17	558	6	25	17	11	300	297	632	343	6
5	Brunswick at SR 20 NB Ramps	0	1099	354	0	949	200	385	0	386	0	0	0
5	Brunswick at Sutton Way	191	619	17	366	593	388	531	79	105	205	79	293
5	Brunswick at Plaza Way	0	809	0	150	655	74	0	0	34	0	0	0
5	Brunswick at Old Tunnel	35	518	54	199	475	0	10	0	8	57	0	139
5	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
5	Sutton and Old Tunnel Cutoff	0	381	0	0	405	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
5	Year 2020 plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
5	Brunswick at Nevada City Hwy	475	18	591	6	27	18	12	318	316	670	364	6
5	Brunswick at SR 20 NB Ramps	0	1157	383	0	1015	212	408	0	445	0	0	0
5	Brunswick at Sutton Way	96	600	27	469	762	232	503	51	45	368	58	430
5	Brunswick at Plaza Way	0	748	0	0	1105	70	0	0	39	0	0	0
5	Brunswick at Old Tunnel	25	518	65	296	472	0	10	0	10	126	0	220
5	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
5	Sutton and Old Tunnel Cutoff	0	464	0	0	489	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
6	Year 2002 Plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
6	Brunswick at Nevada City Hwy	447	17	558	6	25	17	11	300	297	632	343	6
6	Brunswick at SR 20 NB Ramps	0	1099	354	0	949	200	385	0	386	0	0	0
6	Brunswick at Sutton Way	191	619	17	366	593	388	531	79	105	205	79	293
6	Brunswick at Plaza Way	0	809	0	150	655	74	0	0	34	0	0	0
6	Brunswick at Old Tunnel	35	518	54	199	475	0	10	0	8	57	0	139
6	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
6	Sutton and Old Tunnel Cutoff	0	381	0	0	405	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
6	Year 2020 plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
6	Brunswick at Nevada City Hwy	475	18	591	6	27	18	12	318	316	670	364	6
6	Brunswick at SR 20 NB Ramps	0	1157	383	0	1015	212	408	0	445	0	0	0
6	Brunswick at Sutton Way	96	600	27	469	762	232	503	51	45	368	58	430
6	Brunswick at Plaza Way	0	748	0	0	1105	70	0	0	39	0	0	0
6	Brunswick at Old Tunnel	25	518	65	296	472	0	10	0	10	126	0	220
6	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
6	Sutton and Old Tunnel Cutoff	0	464	0	0	489	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
7	Year 2002 Plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
7	Brunswick at Nevada City Hwy	447	17	558	6	25	17	11	300	297	632	343	6
7	Brunswick at SR 20 NB Ramps	0	1099	354	0	949	200	385	0	386	0	0	0
7	Brunswick at Sutton Way	191	619	17	366	593	388	531	79	105	205	79	293
7	Brunswick at Plaza Way	0	809	0	150	655	74	0	0	34	0	0	0
7	Brunswick at Old Tunnel	35	518	54	199	475	0	10	0	8	57	0	139
7	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
7	Sutton and Old Tunnel Cutoff	0	381	0	0	405	0	0	0	0	0	0	0

Scenario		NB			SB			EB			WB	
7	Year 2020 plus Project Traffic	L	T	R	L	T	R	L	T	R	L	T	R
7	Brunswick at Nevada City Hwy	475	18	591	6	27	18	12	318	316	670	364	6
7	Brunswick at SR 20 NB Ramps	0	1157	383	0	1015	212	408	0	445	0	0	0
7	Brunswick at Sutton Way	96	600	27	469	762	232	503	51	45	368	58	430
7	Brunswick at Plaza Way	0	748	0	0	1105	70	0	0	39	0	0	0
7	Brunswick at Old Tunnel	25	518	65	296	472	0	10	0	10	126	0	220
7	Olympia and Old Tunnel Cutoff	0	0	0	0	0	0	0	0	0	0	0	0
7	Sutton and Old Tunnel Cutoff	0	464	0	0	489	0	0	0	0	0	0	0